

## CLAIMS

1. A vaccine composition for vaccinating dogs comprising any one or more of:

- (a) an agent capable of raising an immune response against *Streptococcus equi sub species zooepidemicus* (*S. zooepidemicus*) in a dog;
- (b) an agent capable of raising an immune response against *Mycoplasma cynos* (*M. cynos*) in a dog; and
- (c) an agent capable of raising an immune response against a *Chlamydophila* in a dog.

2. A vaccine composition according to Claim 1 wherein the agent capable of raising an immune response against *S. zooepidemicus* in a dog comprises inactivated or attenuated *S. zooepidemicus*, or an immunogenic fragment of *S. zooepidemicus* or a derivative thereof, or a nucleic acid encoding said fraction or said derivative.

3. A vaccine composition according to Claim 1 or 2 wherein the agent capable of raising an immune response against *M. cynos* in a dog comprises inactivated or attenuated *M. cynos*, or an immunogenic fragment of *M. cynos* or a derivative thereof, or a nucleic acid encoding said fraction or said derivative.

4. A vaccine composition according to any of Claims 1 to 3 wherein the agent capable of raising an immune response in a dog against a *Chlamydophila* comprises inactivated or attenuated *Chlamydophila abortus*, or an immunogenic fragment of *Chlamydophila abortus* or a derivative thereof, or a nucleic acid encoding said fraction or said derivative.

5. A vaccine composition according to any of Claims 1 to 3 wherein the agent capable of raising an immune response in a dog against a *Chlamydophila* comprises inactivated or attenuated *Chlamydophila psittaci*, or an immunogenic fragment of *Chlamydophila psittaci* or a derivative thereof, or a nucleic acid encoding said fraction or said derivative.

6. A vaccine composition according to any of Claims 1 to 3 wherein the agent capable of raising an immune response in a dog against a *Chlamydophila* comprises inactivated or attenuated *Chlamydophila felis*, or an immunogenic fragment of *Chlamydophila felis* or a derivative thereof, or a nucleic acid encoding said fraction or said derivative.

7. A vaccine composition according to any of Claims 1 to 3 wherein the agent capable of raising an immune response in a dog against a *Chlamydophila* comprises inactivated or attenuated *Chlamydia muridarum*, *Chlamydia pecorum*, *Chlamydia pneumoniae*, *Chlamydia suis* or *Chlamydia trachomatis*, or an immunogenic fragment thereof, or a derivative thereof, or a nucleic acid encoding said fraction or said derivative.

8. A vaccine composition according to any of Claims 1 to 7 and a pharmaceutically acceptable carrier, diluent or adjuvant.

9. A vaccine composition according to any of Claims 1 to 8 further comprising any one or more of:

(d) an agent capable of raising an immune response in a dog against canine respiratory coronavirus (CRCV);

(e) an agent capable of raising an immune response in a dog against canine parainfluenzavirus (CPIV);

- (f) an agent capable of raising an immune response in a dog against canine adenovirus type 2 (CAV-2);
- (g) an agent capable of raising an immune response in a dog against canine herpesvirus (CHV); and
- (h) an agent capable of raising an immune response in a dog against *Bordetella bronchiseptica* (*B. bronchiseptica*).

10. A vaccine composition according to Claim 9 wherein the agent capable of raising an immune response in a dog against CRCV comprises inactivated or attenuated CRCV, or an immunogenic fragment thereof, or a nucleic acid encoding said immunogenic fraction.

11. A vaccine composition according to Claim 10 wherein the immunogenic fragment of CRCV comprises the Spike protein or the hemagglutinin-esterase (HE) protein, or an immunogenic portion of the Spike or HE protein.

12. A vaccine composition according to any of Claims 9 to 11 wherein the agent capable of raising an immune response in a dog against CPIV comprises inactivated or attenuated CPIV, or an immunogenic fragment thereof, or a nucleic acid encoding said immunogenic fraction.

13. A vaccine composition according to any of Claims 9 to 12 wherein the agent capable of raising an immune response in a dog against CAV-2 comprises inactivated or attenuated CAV-2, or an immunogenic fragment thereof, or a nucleic acid encoding said immunogenic fraction.

14. A vaccine composition according to any of Claims 9 to 13 wherein the agent capable of raising an immune response in a dog against CHV comprises inactivated or attenuated CHV, or an immunogenic fragment thereof, or a nucleic acid encoding said immunogenic fraction.

15. A vaccine composition according to any of Claims 9 to 14 wherein the agent capable of raising an immune response in a dog against *B. bronchiseptica* comprises inactivated or attenuated *B. bronchiseptica*, or an immunogenic fragment thereof, or a nucleic acid encoding said immunogenic fraction.

16. A method of vaccinating a dog against canine infectious respiratory disease (CIRD) comprising administering to the dog a vaccine composition according to any of Claims 1 to 15.

17. A method of treating CIRD in a dog comprising administering to the dog a vaccine composition according to any of Claims 1-15.

18. A method of stimulating an immune response against any one or more of *S. zooepidemicus*, *M. cynos* and a *Chlamydophila* in a dog, the method comprising administering to the dog a respective any one or more of:

(a) an agent capable of raising an immune response against *S. zooepidemicus* in a dog;

(b) an agent capable of raising an immune response against *M. cynos* in a dog; and

(c) an agent capable of raising an immune response against a *Chlamydophila* in a dog.

19. A method according to Claim 18 further comprising administering to the dog any one or more of:

(d) an agent capable of raising an immune response in a dog against CRCV;

(e) an agent capable of raising an immune response in a dog against CPiV;

(f) an agent capable of raising an immune response in a dog against CAV-2;

(g) an agent capable of raising an immune response in a dog against CHV; and

(h) an agent capable of raising an immune response in a dog against *B. bronchiseptica*.

20. Use of any one or more of:

(a) an agent capable of raising an immune response against *S. zooepidemicus* in a dog;

(b) an agent capable of raising an immune response against *M. cynos* in a dog; and

(c) an agent capable of raising an immune response against a *Chlamydophila* in a dog.

in the preparation of a medicament for prophylaxis or treatment of CIRDC in a dog.

21. Use of any one or more of:

(a) an agent capable of raising an immune response against *S. zooepidemicus* in a dog;

(b) an agent capable of raising an immune response against *M. cynos* in a dog; and

(c) an agent capable of raising an immune response against a *Chlamydophila* in a dog,

in the preparation of a medicament for stimulating an immune response against said respective any one or more of *S. zooepidemicus*, *M. cynos* and a *Chlamydophila* in a dog.

22. The use according to Claim 20 or 21 wherein the medicament further comprises any one or more of:

(d) an agent capable of raising an immune response in a dog against CRCV;

(e) an agent capable of raising an immune response in a dog against CPiV;

(f) an agent capable of raising an immune response in a dog against CAV-2;

(g) an agent capable of raising an immune response in a dog against CHV; and

(h) an agent capable of raising an immune response in a dog against *B. bronchiseptica*.

23. A composition comprising any one or more of:

(a) an agent capable of raising an immune response against *S. zooepidemicus* in a dog;

(b) an agent capable of raising an immune response against *M. cynos* in a dog; and

(c) an agent capable of raising an immune response against a *Chlamydophila* in a dog,  
for use in medicine.

24. A composition according to Claim 23 for use in veterinary medicine.

25. A composition according to Claim 24 for use in canine veterinary medicine.

26. A composition according to any of Claims 23 to 25 further comprising any one or more of:

(d) an agent capable of raising an immune response in a dog against CRCV;

(e) an agent capable of raising an immune response in a dog against CPiV;

(f) an agent capable of raising an immune response in a dog against CAV-2;

(g) an agent capable of raising an immune response in a dog against CHV; and

(h) an agent capable of raising an immune response in a dog against *B. bronchiseptica*.

27. A kit of parts for a vaccine composition, comprising any one or more of:

(a) an agent capable of raising an immune response against *S. zooepidemicus* in a dog;

(b) an agent capable of raising an immune response against *M. cynos* in a dog; and

(c) an agent capable of raising an immune response against a *Chlamydophila* in a dog,

and optionally a pharmaceutically acceptable carrier, diluent or adjuvant.

28. The kit according to Claim 27 further comprising any one or more of:

(d) an agent capable of raising an immune response in a dog against CRCV;

(e) an agent capable of raising an immune response in a dog against CPIV;

(f) an agent capable of raising an immune response in a dog against CAV-2;

(g) an agent capable of raising an immune response in a dog against CHV; and

(h) an agent capable of raising an immune response in a dog against *B. bronchiseptica*.

29. A method of making an antibody that specifically binds to any one or more of *S. zooepidemicus*, *M. cynos* or a *Chlamydophila* comprising raising an immune response to a respective any one or more of *S. zooepidemicus*, *M. cynos* or a *Chlamydophila*, or an immunogenic fragment thereof in an animal, and preparing an antibody from the animal or from an immortal cell derived therefrom.

30. A method of obtaining an antibody that specifically binds to any one or more of *S. zooepidemicus*, *M. cynos* or a *Chlamydophila* comprising selecting an antibody from an antibody-display library using a respective any one or more of *S. zooepidemicus*, *M. cynos* or a *Chlamydophila*, or an immunogenic fragment thereof.

31. An antibody that specifically binds to *S. zooepidemicus*, *M. cynos* or a *Chlamydophila*.

32. A method of passively immunising a dog against CIRDC comprising administering to the dog one or more antibodies that specifically bind to a respective one or more of *S. zooepidemicus*, *M. cynos*, and a *Chlamydophila*.

33. A method of treating CIRDC in a dog comprising administering to the dog one or more antibodies that specifically bind to a respective one or more of *S. zooepidemicus*, *M. cynos*, and a *Chlamydophila*.

34. A method according to Claim 32 or 33 further comprising administering to the dog antibodies that specifically bind to any one or more of CRCV, CPiV, CAV-2, CHV, and *B. bronchiseptica*.



35. Use of antibodies that specifically bind to any one or more of *S. zooepidemicus*, *M. cynos* and a *Chlamydophila* in the preparation of a medicament for passively immunising a dog against CIRDC.

36. Use of antibodies that specifically bind to any one or more of *S. zooepidemicus*, *M. cynos* and a *Chlamydophila* in the preparation of a medicament for treating CIRDC in a dog.

37. Use according to Claim 35 or 36 wherein the medicament further comprises antibodies that specifically bind to any one or more of CRCV, CPIV, CAV-2, CHV, and *B. bronchiseptica*.

38. A composition comprising any two or more of an antibody that specifically binds to *S. zooepidemicus*, an antibody that specifically binds to *M. cynos*, and an antibody that specifically binds to a *Chlamydophila*.

39. A composition according to Claim 38 further comprising antibodies that specifically bind to any one or more of CRCV, CPIV, CAV-2, CHV, and *B. bronchiseptica*.

40. A vaccine composition comprising:

(b) an agent capable of raising an immune response against *M. cynos* in a dog; and

(d) an agent capable of raising an immune response against CRCV in a dog.

41. The vaccine composition according to Claim 40 further comprising any one or more of:

(c) an agent capable of raising an immune response against a *Chlamydophila* in a dog; .

- (e) an agent capable of raising an immune response in a dog against CPiV;
- (f) an agent capable of raising an immune response in a dog against CAV-2;
- (g) an agent capable of raising an immune response against CHV in a dog; and
- (h) an agent capable of raising an immune response in a dog against *B. bronchiseptica*.

42. The vaccine composition according to Claim 40 or 41 further comprising:

- (a) an agent capable of raising an immune response against *S. zooepidemicus* in a dog.

43. A method of determining whether a dog has been exposed to a *Chlamydomphila* species associated with CIRd, the method comprising:

- (a) obtaining a suitable sample from the dog; and
- (b) identifying a *Chlamydomphila* species associated with CIRd, or an antibody there to, in the sample.

44. A method according to Claim 43 wherein the *Chlamydomphila* species associated with CIRd has 23S rRNA comprising the sequence (when shown as RNA) of any of SEQ ID No: 1 to 8.

45. A method of determining whether a dog has or is susceptible to CIRd, the method comprising:

- (a) obtaining a suitable sample from the dog; and
- (b) identifying any one or more of *S. zooepidemicus* or *M. cynos* or *Chlamydomphila*, or an antibody to any of these, in the sample.

46. A method according to Claim 45 wherein the *S. zooepidemicus* or *M. cynos* or *Chlamydophila* is identified using an antibody.
47. A method according to Claim 45 wherein the *S. zooepidemicus* or *M. cynos* or *Chlamydophila* is identified using a nucleic acid.
48. A method according to Claim 45 wherein the anti-*S. zooepidemicus* antibody is detected using a *S. zooepidemicus* or an antigenic portion thereof.
49. A method according to Claim 45 wherein the anti-*M. cynos* antibody is detected using a *M. cynos* or an antigenic portion thereof.
50. A method according to Claim 45 wherein the anti-*Chlamydophila* antibody is detected using a *Chlamydophila* or an antigenic portion thereof.
51. A method according to any one of Claims 43 to 49 wherein the sample is an antibody-containing sample such as serum, saliva, tracheal wash or branchiolar lavage.
52. An immunosorbent assay for detecting antibodies associated with CIRD, the assay comprising:
- a solid phase coated with any one or more of (a) an agent capable of raising an immune response against *S. zooepidemicus* in a dog; (b) an agent capable of raising an immune response against *M. cynos* in a dog; and (c) an agent capable of raising an immune response against a *Chlamydophila* in a dog;
  - and a detectable label conjugate which will bind to the antibodies bound to the solid phase.

53. An immunosorbent assay according to Claim 52 wherein the solid phase contains any two or all three of (a), (b) and (c).

54. A solid phase substrate coated with any one or two or all three of (a), (b) and (c) as defined in Claim 52.